Attorney Docket No. 72.053 *PATENT*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Günter Kunze et al. Art Unit: 1723

Appl. No.: 09/937,331 Examiner: Tony Glen Soohoo

Filing Date: September 21, 2001 Confirmation No. 9486

Title: *Internal Vibrator with a Measuring System*

Assignee: Wacker Construction Equipment AG

SUPPLEMENTAL DECLARATION OF DR. GEORG SICK UNDER 37 CFR §1.132

1, Dr. Georg Sick, hereby declare and state as follows:

1. I make this declaration in supplement to my Declaration dated August 8, 2005 in support of a response to the outstanding Office Action in U.S. Patent Application No. 09/937,331 entitled "*Internal Vibrator with a Measuring System*" (the '331 Application) which claims priority to German Patent Application Serial No. 199 13 077.9; filed March 23, 1999.

2. 1 believe, based on my knowledge of the invention disclosed and claimed in the '331 Application, that the claimed invention of the '331 Application is sufficiently enabled as of the filing of the instant patent application to allow one skilled in the art to make and use the invention without undue experimentation. The reasons for my belief are detailed in the paragraphs that follow.

3. Creating maps or algorithms from acquired data as described in that passage is a routine task for me and, 1 believe, others skilled in the art. To create a densification map, all one need to is to conduct a preliminary test by measuring density during operation of a poker vibrator using known techniques to measure concrete density and to observe, for each measuring incremental densification level, a corresponding vibrator operational parameter such as acceleration. The observed operational parameter can then be tabulated or "mapped" for an entire range of measured densities, and the map can be stored in an evaluation circuit of a poker vibrator and

used to indicate densification during operation of the poker vibrator by monitoring the parameter that was observed during the preliminary test.

4. Concrete density can be measured in multiple ways known to me and I believe, to others skilled in the art. For instance, one test known to me and, I believe, to others skilled in the art involves a visible inspection to determine when the occurrence of air bubbles at the surface of the concrete has stopped, providing, an indication of the achievement of the final density of the concrete. Densification can also be measured by measuring the drop in the height of the concrete in a defined volume during vibration. The observed settlement of the surface is associated with the displace air bubbles rising to the surface. Alternatively, laboratory density measurements of cut-off sections of concrete can be taken after the concrete cures.

5. Signals from conventional acceleration detectors such as those disclosed in the present patent application could then be correlated with the above-described densification data to develop the maps and/or algorithms. If an acceleration signal is available, frequency and amplitude can be derived using routine mathematical treatments such as interpolation. The enclosed publication illustrates the routine skill known at the time of filing needed to correlate acceleration signals to derive a measure of the frequency and amplitude of an internal vibrator (See "Fast-Fourier Transformation with a Time Signal", Technische Universitat Dresden, (March 20, 2000), p. 26. Other characteristics can be correlated in the same manner. Motor RPM and winding temperature can be measured with known techniques, such as Hall sensors or thermocouples. Once such a map is created and stored in the disclosed on-board memory, it is a small matter to produce a signal based on a measured change in the operating parameter that corresponds to a change in a densified state of the material.

6. Based on a reading of the '331 Application and using the routine methods known in the art as described above, I estimated that would take me not more than 6 hours to create a map or

algorithm relating the monitored parameter to the trend in the densified state of the material as disclosed in the specification, which in my opinion is not undue experimentation for one skilled.

7. In short, based on the GB 1097651 patent (as discussed in the Sick Declaration dated August 8, 2005) and other cited references and the above-described known techniques known at the time of filing, in my opinion, the claimed invention of the '131 Application is sufficiently enabled as of the filing of the instant patent application to allow one skilled in the art to make and use the invention without undue experimentation.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: May 23, 2006

Dr. Georg Sick

5.1.2 Fast – Fourier - Transformation mit einem Zeitsignal (FFT1)

Dieser Teil des Auswertealgorithmus ermittelt die Läuferfrequenz (Drehzahl) des Innenrüttlers, erzeugt mit einer Maximalwertsuche einen Hilfskanal mit den auftretenden Frequenzen und integriert die Kanäle 1; 2; 7; 8 und 9. Er bereitet damit die Fast – Fourier – Transformation mit zwei Zeitsignalen (FFT2) vor.

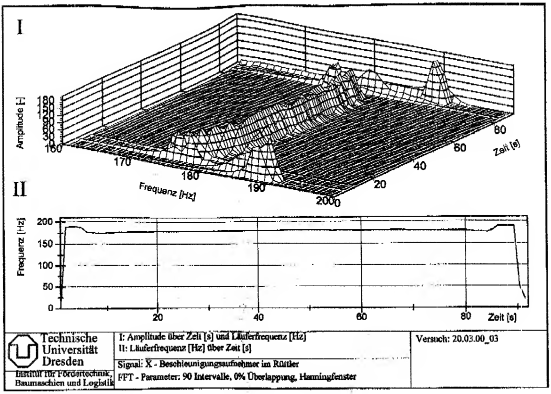

Bild 11 Frequenzraum

Weiterhin werden hier auch Parameter für beide FFT – Operationen, wie Intervallanzahl, Fensterart, Überlappung und Bereich, vorgegeben.

Um die zeitliche Veränderung der Frequenz zu ermitteln, wird der gesamte Zeitbereich der Messung in Intervalle gleicher Länge aufgeteilt. Die Intervallänge wird dabei von den Parametern Intervallanzahl, Überlappung und Bereich bestimmt und sollte dabei einer Potenz von 2 entsprechen. Mit jedem dieser Intervalle wird dann eine FFT1 durchgeführt. Die Lage der jeweiligen Phase am Anfang und am Ende eines solchen Intervalls ist dabei nicht zu beeinflussen. Wenn aber die Phase hier nicht 0° oder 180° ist, führt dies u.U. zu Frequenzsprüngen im Spektrum. Um das zu vermeiden, wird jedes Intervall mit einer sog. Fensterfunktion (Parameter Fensterart) multipliziert. Nach Abschluß dieser Berechnung liegt ein Funktionsraum *(Bild 10)* vor, der die Rüttelamplitude in Abhängigkeit von Meßzeit und Frequenz zeigt. Die Zeit-

5.1.2. Fast Fourier transformation using a time signal (FFT1)

This part of the evaluation algorithm determines the rotor frequency (rotational speed) of the internal vibrator, uses a maximum value search to produce an auxiliary channel having the occurrent frequencies, and integrates channels 1; 2; 7; 8 and 9. In this way, it prepares the fast Fourier transformation with two time signals (FFT2).

In addition, parameters are also predetermined here for both FFT operations, such as number of intervals, type of window, overlap, and range.

In order to determine the change over time of the frequency, the overall time period of the measurement is divided into intervals of equal length. The interval length is determined by the parameters: number of intervals, overlap, and range, and should correspond to a power of 2. An FFT1 is then carried out with each of these intervals. The position of the respective phase at the beginning and at the end of such an interval is not to be influenced here. However, if the phase here is not 0° or 180°, under some circumstances this results in frequency jumps in the spectrum. In order to avoid this, each interval is multiplied by what is known as a window function (parameter: window type). After this calculation has been performed, a function space (*Figure 10*) is present that indicates the vibration amplitude dependent on measurement time and frequency. The time **[...]**

[Figure:]

[Caption:] Figure 11: Frequency space

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Amplitude: amplitude

Frequenz: frequency

Zeit: time

I: Amplitude über Zeit [s] und Läuferfrequenz [Hz]: amplitude over time [s] and rotor frequency [Hz]

II: Läuferfrequenz [Hz] über Zeit [s]: rotor frequency [Hz] over time [s]

Signal: X-Beschleunigungsaufnehmer im Rüttler: Signal: X acceleration sensors in the vibrator

FFT-Parameter: 90 Intervalle, 0% Überlappung, Harmingfenster: FFT parameters: 90 intervals, 0% overlapping, harming window

Versuch: trial

[note: 20.03.00 could be 20 March 2000]